

some reason the locusts would not touch the other poisoned baits.

The concluding part (v.) reviews the systematic position of the Bombay locust, and gives a useful list of other species found with it. These locusts are figured in the plates.

Half this report consists of four appendices. The first deals with the action taken against locusts in the Bombay Presidency. Summing up the campaign against the locust in 1904, it is made quite evident that a very determined effort was made to cope with this pest, and that the excellent organisation that extended to every village in the Presidency was effectual in producing a very general action on the part of the people. This is all the more remarkable when we consider the natural apathy of the ryot and his strong objection to take life of any kind. Yet we are told in the report that "4152 maunds of adults, equivalent to 66,432,000 individuals, were destroyed, or two-tenths of a per cent. of the estimated number." One hundred maunds of eggs were destroyed, representing 400,000,000 individuals, and 13,252 maunds of "hoppers," which represented some 530,000,000. That is, 930 millions of young were destroyed!

In all some 1500 millions were probably accounted for, including adults, eggs, and hoppers; of these 66 millions were adults, which would have been responsible for another 3000 million "hoppers" had they lived. To accomplish this the Bombay Government spent a little more than two lakhs in rewards. Anyone knowing what "locust swarms" mean to the cultivator will acknowledge that this sum was well spent. In the same appendix are notes on the latest invasion of the Portuguese territory of Goa, where the damage in 1904 was also very great. Fears were entertained that the locusts might make their way to the seaboard and destroy the magnificent paying cocoanut trees, one of the chief sources of revenue to the country.

The second appendix is by Mr. B. P. Standen. In it are mentioned various methods used to cope with the locusts, such as the American "hopper dozer," the Russian wheeled revolving brush, bags, poison bait, bonfires, &c. But in the end of all this Mr. Standen tells us (p. 92) that "the efforts were aided in a remarkable fashion by juari birds (the Rosy Pastor), which arrived in large flocks earlier than usual and devoured the locusts greedily." . . . "It is quite possible that the preservation of the crops was due as much to these birds as to the effects of human agency." Yet a few lines further back we are told in his report that the Deputy Commissioner of Wardha considered that a third of the total number of hoppers were destroyed by the measures adopted, whilst others estimated that half at least were destroyed.

Besides the plates of various species and structural peculiarities, there is also a map showing the infested area in 1903-4.

FRED. V. THEOBALD.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The second Frank Smart studentship in botany, tenable at Gonville and Caius College, has been awarded to Mr. F. T. Brooks, late scholar of Emmanuel College, the understanding being that the student shall prosecute research in some special branch of scientific forestry.

—

MR. SYDNEY PENNINGTON has been appointed an instructor in veterinary science in the School of Agriculture, Ghizeh, Egypt.

MR. J. BLAKEMAN, Trinity College, Cambridge, has been appointed mathematical master at the Municipal Technical School, Leicester.

THE results of the annual examination held last July by the Oxford and Cambridge Schools Examination Board have now been issued. The total number of candidates for higher certificates was 2054, of whom 462 were girls offering letters only. Of these candidates 1084 offered Latin, 882 Greek, and 1369 French. In natural philosophy

there were 143 candidates in the mechanical division, 131 in the physical division, and 132 in the chemical division. Physical geography and geology were offered by forty candidates, and biology by 183. The total number of candidates for lower certificates was 1046, and the number of candidates offering the several subjects mentioned was as follows:—Latin, 668; Greek, 393; French, 993; mechanics and physics, 74; physics and chemistry, 235; chemistry and mechanics, 23; and botany, 62. The candidates in this examination are almost entirely from public schools, and the numbers given are interesting, since they indicate the relative importance attached to linguistic and scientific studies in these schools.

AMONG calendars which have been received recently, that of the East London College, in the Mile End Road, is of special interest, showing as it does the admirable provision now made in East London for higher education. The object of the college is to provide such instruction in the various branches of a liberal education as will qualify students to take degrees at the University of London and other universities of the United Kingdom; to give such instruction in science and technology as will be serviceable to students who intend to pursue a profession or trade in which a knowledge of science in its practical applications is required; and generally to promote higher education in East London. The engineering department and other portions of the college premises have been enlarged recently at the expense of the Drapers' Company, which has made a further grant of 5000*l.* for this purpose. This company is again awarding valuable scholarships tenable at the college. The staff, too, has been strengthened, and there is every prospect of a highly successful session's work.

THE London County Council has organised for the session 1906-7 courses of instruction for teachers. These courses are open without fee to teachers in London schools, and are intended to offer to teachers in the various types of schools opportunities for developing their knowledge of different subjects and of coming into contact with those who have made a special study of the subjects in question. The Council is of opinion that few things can be of greater assistance to teachers than personal contact with some experienced teacher who has devoted special attention to a particular subject, or has made a study of the best methods of presenting the subject to others. The courses include partly lectures and demonstrations in special subjects, such as manual training, general elementary science, physics, chemistry, botany, and also courses conducted under the auspices of the County Council at the schools of the university, namely, University College, King's College, Bedford College, and the London School of Economics and Political Science. Full particulars with regard to the courses may be obtained from the executive officer, Education Offices, London County Council, Victoria Embankment, W.C.

#### SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 24.—Croonian Lecture, 1906.—"On Nerve Endings and on Special Excitable Substances in Cells." By Prof. J. N. Langley, F.R.S.

The author stated in his general conclusions that the paper had shown there was reason to believe that in each of the three great types of connection of the peripheral end of an efferent nerve with a cell, it is some constituent of the cell substance which is stimulated or paralysed by poison ordinarily taken as stimulating or paralysing nerve endings. Reasons, though less complete, have been given for supposing that these poisons have no special action on nerve endings, and that physiologically the nerve ending is not essentially different from the nerve fibre. In that case, not only the function of reacting to numerous chemical bodies, but probably also the special liability of both afferent and efferent nerves to fatigue must be transferred from the nerve endings to the same constituent of the cell.

This theory adds to the complexity of the cell. It necessitates the presence in it of one or more substances (receptive substances) which are capable of receiving and

transmitting stimuli, and capable of isolated paralysis, and also of a substance or substances concerned with the main function of the cell (contraction or secretion, or in the case of nerve cells of discharging nerve impulses). So far as this is concerned, it does but accentuate a view which has often been put forward, and which, indeed, in some form or other is inseparable from the idea of protoplasm.

The author had spoken of different "substances" in the cell with the intent to use as vague a term as possible. The "substances," he took it, are radicles of the protoplasmic molecule; at present, however, he did not think it advisable to speculate further, either on this question or on certain other questions raised by the conclusions arrived at in the paper. There are a number of obvious experiments still to be made, and these, it may be hoped, will settle some of the problems, the solution of which is now but guesswork.

June 14.—"The Experimental Analysis of the Growth of Cancer." By E. F. **Bashford**, J. A. **Murray**, and W. H. **Bowen**.

The proliferation of Jensen's tumour when propagated in large numbers of mice is not uniformly progressive, but presents fluctuations which can be referred, with confidence, to the tumour cells themselves. The experimental conditions which introduce irregularities are shown to be (1) differences in race of the mice used, *e.g.* tame or wild; (2) differences in age of mice even of the same kind—young animals are measurably more suitable than adult animals; (3) the site of implantation of the cellular graft—the subcutaneous tissue of the back was found to be more suitable than, for example, the peritoneal cavity; (4) the size of the graft was found to be of importance, but mainly as modifying the apparent rate of growth; large grafts of more than 0.1 gram, however, were less successful than smaller ones of from 0.01 gram to 0.02 gram, as previously shown by Jensen; (5) the mode of introduction influences the success of the experiments, transplantation of small fragments of unaltered tumour giving better results than the injection of a suspension of tumour cells in physiological salt solution.

Artificial propagation was carried out on a large scale for a long period by transplantation of grafts of from 0.01 gram to 0.02 gram of unaltered tumour into the dorsal subcutaneous tissue of young tame mice from five to seven weeks old. Each tumour was transplanted into forty or more mice, and the results compared by estimating the percentage of success on the number of animals remaining alive after ten days. The method adopted results in the separation in a large number of animals of the descendants of cells previously living in one animal, so that after two or three successive transplants the whole of the tumour in one animal represents the offspring of a very small part of a preceding tumour, and in the limit the progeny of a single cell in a tumour more or less remote. The percentage of success obtained with any tumour is used as an indication of the frequency in it of cells capable of continuing growth, and the results at different times and with a number of propagated tumours are compared by means of graphic records. The dates of transplantation are measured as abscissæ and the percentages of success as ordinates. Several such graphic records illustrate the paper, and show that the percentage of success does not vary irregularly, but that, commencing with a tumour giving a low percentage, successive transplantations may be more and more successful until a maximum is reached, it may be at 60 per cent., at 70 per cent., or at 100 per cent. The subsequent transplantations are not so successful. The percentage of success falls rapidly either at the first essay or in two or more steps until a minimum is reached, after which the process is repeated. It is concluded that the tumour cells present a cyclical activity, and suggested that the period of lower percentage of success represents a failure of the proliferative powers from which recovery occurs when the transplantations show again a progressively higher percentage of success. A graphic record of the behaviour of a large number of separate strains shows a continuously high maximum of success between 70 per cent. and 90 per cent. due to the successive development of maxima in separate strains, and it is suggested that sporadic tumours possess a similar com-

plexity, so that growth may be proceeding rapidly at one part while dying out at another.

Spontaneous absorption of well-established tumours occurred at the same time as the rapid fall in percentage of success, failure of the cells to establish themselves in new animals coinciding with cessation of growth and extinction in animals in which they had been able to grow for a time. Without prejudice to other factors, it may be presumed that the greater frequency of spontaneous absorption in transplanted tumours may be due to their greater homogeneity resulting from the repeated intercalation of what is virtually a unicellular stage.

The extinction of certain strains of Jensen's tumour is alluded to and compared with the results of transplanting two other spontaneous mouse carcinomata, which after successful transference to normal animals gave progressively lower percentages of success until negative results were obtained.

The results indicate the necessity for caution in interpreting experiments designed to modify the growth of propagated tumours, and for accurate records of their previous history as a necessary accompaniment to therapeutical experiments.

June 21.—"On the Electric Inductive Capacities of Dry Paper and of Solid Cellulose." By Albert **Campbell**.

June 28.—"Sex-determination in *Hydatina*, with some Remarks on Parthenogenesis." By R. C. **Punnett**.

July 12.—"A Method for determining Velocities of Saponification." By James **Walker**.

The author takes advantage of the change in electrical conductivity for following the progress of the action of a caustic alkali on an ester. The conductivity of the original solution falls off to about one-third as the saponification proceeds, and the relation between change of conductivity and proportion transformed is very nearly linear. A device is described for simplifying the calculation of the velocity constant by appropriate selection of the resistance in the rheostat. Readings can easily be taken every minute, and the method is much less troublesome than the titration method usually employed, whilst yielding equally accurate results.

EDINBURGH.

**Royal Society**, July 16.—The Hon. Lord M'Laren, vice-president, in the chair.—Limnographic apparatus and measurements on Loch Earn: Prof. **Chrystal**. The paper gave a detailed account of the various modifications and simplifications which experience had suggested during the recording of seiches on the Scottish lochs. The effects of friction had been reduced to a minimum, so that it was possible to obtain records of short period motions such as wind and other meteorological causes produce. The effect of access tubes connecting the well of the limnograph with the free water of the loch had been studied with great care. By use of a proper sized access tube the shorter disturbances could be cut off and the seiche recorded in all its purity. A new and very simple method of reduction of limnograms so as to separate the various orders of seiches was described. This method of "residuation" consisted simply in superposing the seiche record upon itself displaced half the uninodal period forward. This eliminated the uninodal seiche and left the binodal and trinodal, if such were present. A second application of the same method eliminated the binodal, and in this way the principal nodalities could be separated with great ease and accuracy. It was impossible to apply harmonic analysis to seiches simply because there was no harmonic relation among the periods of the various nodalities.—Preliminary limnographic observations on Loch Earn: Mr. James **Murray**. This paper supplemented the previous paper, and described the difficulties encountered in measuring the seiches by the forms of apparatus devised by Prof. Chrystal. For eye observations the portable seismoscope had been found very serviceable. It could be installed and taken down again in a few minutes, and packed into a compass small enough to go into one's pocket.—A note on the polarimeter: J. R. **Milne**. Two appliances were described. The first, which consists of a thin plate of glass placed obliquely across half the beam of light passing through the instrument, gives the slight rotation of

the plane of polarisation which is necessary to give the "half-shade" effect. It takes the place of the half wavelength plate used by Laurent and of the subsidiary Nicol used by Lippich. The principle, it was subsequently discovered, had been used by Poyning, but the particular form here described had certain advantages over its predecessor. The second appliance provides a means for increasing the brightness of the very faint field of view given by all half-shade polarimeters, and depends on the fact that when two equally bright fields of view polarised at right angles to each other are received through a double image prism, the brightness of the single field seen by the eye is twice that of each of the component fields. To obtain this effect in the polarimeter, the ordinary half-shade field is divided into two identical portions, the light of one passed through a quartz plate with a  $90^\circ$  rotation, and then both are superposed by a double image prism, which also takes the place of the ordinary analysing Nicol.—Spectroscopic observations of the rotation of the sun (further communication): Dr. J. Haim. In addition to distinct evidence of changes in the rotation of the sun as shown by the displacements of the Fraunhofer lines at the limbs, the observations made between 1901 and 1906 have also revealed the fact of a new displacement of the solar lines which affects both limbs in the same direction. During the interval 1901–6 the Fraunhofer lines have gradually shifted towards the red by an amount slightly more than 0.02 tenth-metre. The solar lines also show greater wave-lengths at the limb than near the centre when compared with the same telluric standards. The relative shift in the case of two iron lines employed by Dunér and by the author is 0.012 tenth-metre. While at least six other "low-level" lines show the same behaviour, the high-level lines appear to occupy essentially the same positions at centre and limb. This remarkable phenomenon may be explained on the assumption that the radiation from the solar gases is affected by pressure. If this explanation be correct, the gradual shift towards the red during the interval 1901–6 would indicate that the solar gases to which the Fraunhofer lines are due are under higher pressure at times of maximum than at times of minimum sun-spot frequency.—A monograph on the general morphology of the myxinoid fishes based on a study of *Myxine*; part ii., the anatomy of the muscles: F. J. Cole.

## PARIS.

Academy of Sciences, August 27.—M. A. Chauveau in the chair.—The earthquake at Valparaiso, August 16, 1906, registered at Paris: G. Bigourdan. A reproduction of the curves registered by the seismograph recently set up at the Observatory of Paris on the night of August 16–17.—The two specific heats of a slightly deformed elastic medium: some extensions of Reech's formula: P. Duhem.—The origin of the carbon monoxide contained in normal blood, and especially in the blood of persons suffering from anaemia: R. Lépine and M. Boulud. The injection into the veins of a dog of sodium oxalate or tartrate causes an increase in the amount of carbon monoxide present. A solution of glucose or levulose has the same result.—The laws of music: Maurice Gandillot.—The copper-steel alloys: Pierre Breuil. Alloys containing proportions of copper varying from 0.0 per cent. to 10.0 per cent. of copper were prepared, and determinations made of the strength of notched specimens submitted to shock, torsional strength, and resistance to corrosion. Micrographical examination gave results confirming those previously published by Stead.—The mechanism of the influence of acids, bases, and salts on the liquefaction of potato starch: A. Fernbach and J. Wolff.—A disease of the potato produced by *Bacillus phytophthorus*: Georges Delacroix.—The haemopoietic activity of serum during the regeneration of the blood: Paul Carnot and Mlle. Cl. Deflandre.

## NEW SOUTH WALES.

Linnean Society, June 27.—Mr. Thos. Steel, president, in the chair.—Studies in Australian entomology, part xv., revision of the Cicindelidae of Australia: Thomas G. Sloane. The paper includes descriptions of two new species, synoptic lists of the tribes (2), genera (5), and species (47) of the family Cicindelidae found in the continent of Australia; also notes on taxonomy, phylogeny, geographical distribution, &c.—Two undescribed species of

Eucalyptus from eastern Australia: R. T. Baker. *Eucalyptus carneae*, sp.nov., and *E. thozetiana*, F.v.M., the species diagnosed in this paper, are found respectively in the coast district and dry interior of the continent. The former is a typical forest stringybark, with a pinkish or flesh-coloured, hard, durable timber. The mature fruits differ very little in shape and size from those of *E. acmenoides*, Schau., but otherwise these two species can be differentiated by their leaves, timber, and oil. This latter constituent is of some chemical and industrial importance, as it contains, besides a dextrorotatory pinene and eucalyptol, an acetic acid ester. Only a small quantity of free acetic acid was found in the crude oil, but the ester split off acid on distilling the oil under atmospheric pressure. Systematically the species should be placed with the stringybarks, and in sequence with *E. nigra*, R. T. B., and *E. acmenoides*, Sch. *E. thozetiana*, F.v.M., ined., has only been known previously to systematists from imperfect material, and both Baron von Mueller and J. H. Maiden refer to it in their writings on the genus. The material upon which the complete description is now based was obtained by Mr. N. C. Champion from his station of Tandawanna, Gooniwindi, Queensland. It attains a height of about 60 feet, has a tesselated bark at the base, and is smooth above to the ultimate branches. The wood is very hard and very heavy, dark coloured, close grained, and interlocked and very durable. It is the hardest yet recorded from any Eucalyptus tree, and very much resembles the South American "lignum vitae," *Guaiacum officinale*, Linn., and is specially suitable for cog-wheel teeth, mallets, girders, bridge-work, &c. Systematically it might be placed with *E. tessellaris*, F.v.M. As both the species described in this paper yield excellent timber, they are recommended for forest cultivation.—The formation of slime or gum by *Rhizobium leguminosarum*: Dr. R. Greig-Smith.—The structure of *Rhizobium leguminosarum*: Dr. R. Greig-Smith.

## CONTENTS.

PAGE

Nile Studies. By J. W. J. . . . .	461
The History of Determinants. By G. B. M. . . . .	462
European Vertebrates. By F. E. B. . . . .	463
Treatment of Water for Steam Boilers and Manufacturers . . . . .	464
Our Book Shelf:—	
"Studies in Anatomy from the Anatomical Department of the University of Manchester" . . . . .	464
de Ball: "Refraktionstafeln" . . . . .	465
South: "The Butterflies of the British Isles."—W. F. K. . . . .	465
Letter to the Editor:—	
The Latest Critic of Biometry.—Prof. Karl Pearson, F.R.S. . . . .	465
Royal Society Addresses. (Illustrated.) . . . . .	466
An American Contribution to Archaeology. By H. R. Hall . . . . .	468
The Immigration of Summer Birds . . . . .	470
Notes . . . . .	470
Our Astronomical Column:—	
Return of Holmes's Comet (1906) . . . . .	474
Comet 1906e (Kopff) . . . . .	474
A Newly-discovered Planetary Nebula . . . . .	474
Plea for an International Southern Telescope . . . . .	474
The Progress of Agricultural Science. By E. H. G. . . . .	474
Russian Geographical Works. (Illustrated.) . . . . .	476
The Matteucci Medal . . . . .	477
Practical Meteorology . . . . .	477
Geography at the British Association . . . . .	478
Physiology at the British Association. By Joseph Barcroft . . . . .	479
Local Societies at the British Association . . . . .	481
The Bombay Locust. By Fred. V. Theobald . . . . .	481
University and Educational Intelligence . . . . .	482
Societies and Academies . . . . .	482